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ABSTRACT

Some research suggests that age differences in memory may result from older adults' difficulty in activating preexisting semantic structures. A study was conducted to examine whether older adults could use experimenter-provided elaborators which facilitate memory, or could generate their own elaborators, and to rate the quality of elaborators generated by older adults. Two groups of adults (16 aged 21-35, 16 aged 60-75) were tested in four elaboration conditions: base sentence with no elaborator; base sentence with precise elaborator; base sentence with imprecise elaborator; and base sentence with instructions to produce elaborators. Subjects in all conditions heard 12 sentences and after 1 minute completed a cued recall test. Analysis of results showed that precise elaborators enhanced recall in both age groups, although older adults compared to younger adults seemed to have some difficulty using precise, experimenter-provided elaborators. Self-generated elaborators signifcantly reduced the age differences in memory and for older adults were more effective than precise elaborators. There were no significant differences for age in the type of elaborators generated. Overall, the findings do not support the hypothesis that older adults fail to access semantic structures. (MCF)

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Generation and Elaboration in Older Adults

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Abstract

Older and younger adults were provided with precise or imprecise elaborators, or they generated their own elaborators. Precise experimenter-provided elaborators did not reduce age-related differences in memory. Generated elaborators, however, attenuated the effects of aging. Quality of generated elaborators was comparable between ages, implying that semantic activation is not affected by aging.

It has been suggested that age differences in memory are due to the disruption of active cognitive operations. Specifically, Craik (1977) has proposed that at encoding older adults may fail to carry out deep or elaborative processing as efficiently as younger adults. Also, they may fail to reinstate these operations at retrieval. According to Craik, however, this inefficient functioning, or production deficiency, does not reflect loss of underlying structures or cognitive functions. Inducing subjects to engage in effective elaborative processing at encoding, and guiding subjects' mental activities at retrieval, should reduce or eliminate age differences.

Recently, however, some investigators have argued that failure to engage in active cognitive operations, or production deficiency, does not fully account for age differences in memory. In particular, Burke & Light (1981) have proposed that older adults have difficulty in activating and utilizing preexisting semantic structures. Age differences in memory, therefore, may result from insufficient activation, and these differences cannot be overcome by the use of appropriate strategies.

The study that we report focuses on elaborative processing to test these different notions. We examined three questions about elaboration, and the possible age-related differences in elaboration.

The first question was whether older adults could use those experimenter-provided elaborators which profoundly facilitate normal memory. Stein & Bransford (1979) suggested that effective

elaborators specify the potential significance and relevance of target words within a particular context. These authors have distinguished between precise and imprecise elaborators. As shown in Table 1, for a given base sentence such as "The fat man read the sign", a precise elaborator would be a continuation such as "warning about the thin ice", and an imprecise elaborator would be "that was two feet high".

Insert Table 1 about here

Both sentences are meaningful, but only the precise elaborator is effective in improving recall because it clarifies the potential significance of the target word "fat". The imprecise elaborator is semantically congruous with the base, but there is no relevance between it and the target word "fat". We drew upon Stein & Bransford's work to examine whether older adults utilize experimenter-provided elaborators.

The second question dealt with the issue of production deficiency. Providing subjects with elaborators does not necessarily reveal the elaborative strategies they use when left to their own devices. Older adults might be able to use experimenter-provided elaborators, but they might fail spontaneously to generate their own elaborators.

To address this, we instructed our subjects to generate their own elaborators. We were interested in whether older adults would benefit when forced to engage in elaborative processing, through the generation of elaborators.

The third question concerned the quality of elaborators generated by older adults. If, as Burke & Light (1981) have suggested, age differences are due to insufficient activation of semantic structures, then older adults may have difficulty generating semantic elaborators, or they may generate a greater number of imprecise or idiosyncratic elaborators. These qualitatively different elaborators may interfere with the subject's ability to remember information. In the present experiment, by rating the generated continuations for precision, we could evaluate the nature of the elaborators.

Method

The overall design of the experiment is shown in Table 2.

Insert Table 2 about here

This was taken from a paradigm used by Stein & Bransford (1979, Experiment 1). Independent groups of younger and older subjects were tested in four elaboration conditions. The no elaboration or base group was given a base sentence such as "The fat man read the sign". The precise elaboration group was given the base and a

precise elaborator such as "The fat man read the sign warning about the thin ice". The imprecise elaboration group was given the base and an imprecise elaborator such as "The fat man read the sign that was two feet high". All three groups rated their respective sentences for comprehensibility. The self-generation group was given the base and then had to produce a meaningful continuation for it. In all groups, examples were provided.

Our younger adults were between ages 21 and 35, with a mean age of 27.3, and our older adults were between ages 60 and 75, with a mean age of 65.8. All subjects first were screened for their ability to complete the tasks, by their performance on the Altus Brief Intelligence Test, a quick administration test of general information and verbal intelligence. The younger adults had a mean Altus score of 9.3, of a possible 13, and the older adults had a mean Altus score of 8.6.

Thus, the design of the experiment was a 2 x 4 factorial, with the two age groups and four elaboration conditions as between-subject variables. There were 16 subjects in each group.

Subjects in all conditions heard 12 sentences. They were given intentional instructions and were allowed 15 seconds for the rating task or the generation task on each sentence. After hearing all 12 sentences, subjects counted backwards for 1 minute and then were given a cued recall test, which is shown in Table 3.

Insert Table 3 about here

This test consisted of the presentation of base sentence frames without the target word. The work "blank" was substituted for the target, so that subjects heard "The blank man read the sign". Subjects had 7 seconds to recall each target word. There were two different study lists, and half the subjects in each group received one list, while the other half received the other list.

Results and Discussion

The mean number of correctly recalled words is shown in Table 4.

Insert Table 4 about here

The overall ANOVA indicated that the main effects of age, type of elaboration, and the interaction of these variables were significant. Further analyses were conducted to parallel the questions posed in the Introduction.

The first question was whether older adults could use precise experimenter-provided elaborators. Comparison of base and precision showed significance for age and elaboration condition, but not for their interaction; precise elaborators enhanced recall for both age groups. However, in comparison with imprecise elaborators, precise elaborators differentially improved recall for younger adults.

Thus, older adults seemed to have some difficulty in using precise-provided elaborators.

The second question was whether the effects of aging were reduced when older adults generated their own elaborators. In comparison to base sentences, older adults seemed to benefit substantially from generated elaborators, but the interaction of age and type of elaboration was not significant due to large variability in the data. However, in comparison with precise elaborators, generated elaborators significantly reduced the age differences in memory. Thus, generated elaborators do not eliminate the age differences in memory, but for older adults they are more effective than precise elaborators.

The third question concerned the quality of elaborators generated by younger and older adults. Two independent judges, with an interjudge agreement of 92%, rated the generated elaborators as precise or imprecise. These data are shown in Table 5.

Insert Table 5 about here

There was no significant difference in the type of generated elaborators between ages. In fact, older adults were surprisingly good at generating precise elaborators. This implies that utilization of semantic structures is not affected by aging. Further evidence for this is provided by comprehensibility data.

Older and younger adults gave the same comprehensibility ratings for base, precise, and imprecise elaborators.

It is clear that older adults did not use precise elaborators provided for them, but they were able to generate precise elaborators. This led us to examine the relationship between the type of generated elaborator and its effect on subsequent cued recall of target words.

As shown in Table 6, both groups recalled more words with precise generated elaborators than they did with imprecise generated elaborators.

Insert Table 6 about here

More importantly, the age difference was not significant; the level of recall did not differ for older and younger adults. This result is, of course, dissimilar to the findings with experimenter provided elaborators. Providing precise elaborators seemed to magnify the age difference. On the other hand, generating precise elaborators eliminated the age difference. It appears that active involvement in elaborative processing (as in generation) is required before older adults can take full advantage of precision.

Additional evidence for this suggestion comes from the comparison of experimenter-provided and self-generated elaborators. As shown in Table 7, when comparing precise provided and precise

generated elaborators, we found a significant age-condition interaction.

Insert Table 7 about here

We did not find a similar interaction when imprecise provided and imprecise generated elaborators were compared. Evidently, when older adults generate elaborators, they benefit differentially from precision.

Overall, this study did not support the notion that older adults fail to access semantic structures. The quality of generated elaborators, and the comprehensibility ratings, were similar for both ages. Howard (1980) has shown that older and younger adults produce the same kinds of associates in a restricted free-association task. Similarly, the older and younger adults in this study generated the same kinds of elaborators to the base sentences.

This study also did not support Craik's notion that equating encoding and guiding retrieval would overcome production deficiency for older adults. The precise provided elaborators in combination with the cued recall task did not result in differential improvement for older adults. Furthermore, in comparison to the base condition, elaborators (generated or provided) did not reduce the age difference in memory.

We did find, however, that the act of generation, and specifically the generation of precise elaborators, overcame production deficiency and resulted in differential improvement in memory for older adults. One must question why generation allows a subject to benefit from precision. One possibility is that use of the precision dimension is not a passive process. Rather, active involvement in elaborative processing is required before older adults can take advantage of precision. The act of generation provides this active involvement. Graf (1982) has suggested that the act of generation forces a subject to attend to the relationship among words. This close attention to, and subsequent enhancement of, the relationship among words helps a subject to integrate the words into one memorable unit. In the present experiment, generation may induce the subject to perceive the significance of semantic relatedness and form an integrated unit between the sentence and the precise elaborator.

In summary, although our results are preliminary and require replication with additional subjects, there are a number of intriguing questions about semantic elaboration, generation, and their relationship. It appears that some active result, in particular generation, may be required for older adults to benefit from semantic encoding. The generation method would allow us to

assess directly a subject's encoding, and to examine the consequences of this encoding.

It is noteworthy that another experiment in recent literature (Till & Walsh, 1980) which combined a generation task with cued recall reported elimination of age differences. Generation with the appropriate cued recall seems to be the method of choice for reducing age differences in memory.

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Table 1

Precise and Imprecise Elaborators

Elaborators	
Precise	The fat man read the sign warning about the thin ice.
Imprecise	The fat man read the sign that was two feet high.

Table 2

Elaboration Conditions

BASE	The fat man read the sign.
PRECISE	The fat man read the sign warning about the thin ice.
IMPRECISE	The fat man read the sign that was two feet high.
GENERATE	The fat man read the sign _____.

Table 3

Recall Cues

BLANK CUE	The _____ man read the sign.

Table 4

Mean Cued Recall of Target Words

	Age	
Elaboration	Younger	Older
Base	6.13	3.19
Precise	8.63	4.25
Imprecise	3.31	2.25
Generation	8.75	7.06

Table 5

Proportion of Elaborators

Generated by Younger and Older Adults

	Age	
Elaboration	Younger	Older
Precise	.62	.60
Imprecise	.38	.40

Table 6

Proportion of Targets Recalled With

Precise and Imprecise Generated Elaborators

	Age	
Elaboration	Younger	Older
Precise	.76	.66
Imprecise	.69	.53

Table 7

Proportion of Targets Recalled

With Provided and Generated Elaborators

	Age	
Elaboration	Younger	Older
Precise Provided	.72	.35
Precise Generated	.76	.66
Imprecise Provided	.28	.19
Imprecise Generated	.69	.53